



***Report from the Small Bodies Assessment Group (SBAG)
to the Planetary Science Advisory Committee***

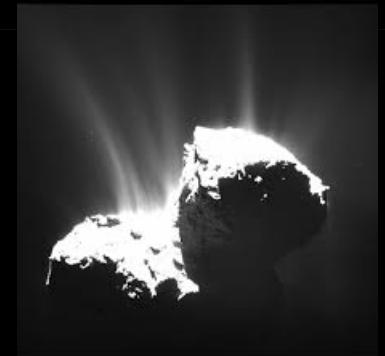
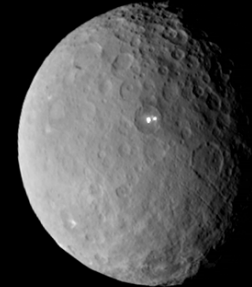
Tim Swindle, SBAG Chair
February 23, 2018

Last SBAG Meeting:
January 17-18, 2018: 18th SBAG Meeting, NASA-Ames Research Center



What is SBAG?

- Charter lists asteroids, comets, interplanetary dust, small satellites, and Trans-Neptunian Objects
 - We also include meteorites, Centaurs
- Young AG (2008)
- Steering committee has leads from three non-science areas
 - Technology, Planetary Defense, Human Exploration
- Meetings often include a focus on a particular topic
 - In situ resource utilization
 - PSDS3 (small sat) small bodies studies
 - Using Astrophysics assets for Solar System science
 - NIAC (technology) studies that affect small bodies



From top, asteroid 1 Ceres, comet 67P Churyumov-Gerasimenko, TNO Pluto



Missions

- Two asteroid sample return missions arrive at targets this year
 - OSIRIS-REx (NASA), Hayabusa-2 (JAXA)
- Extended missions
 - Dawn (Ceres)
 - New Horizons (Kuiper Belt)
 - NEOWISE (Near-Earth Asteroids)
- Selected in Discovery 13 selection
 - Psyche and Lucy investigate different stages in solar system development from study of a metallic asteroid (16 Psyche) and primitive planetesimals (Jupiter Trojans), respectively

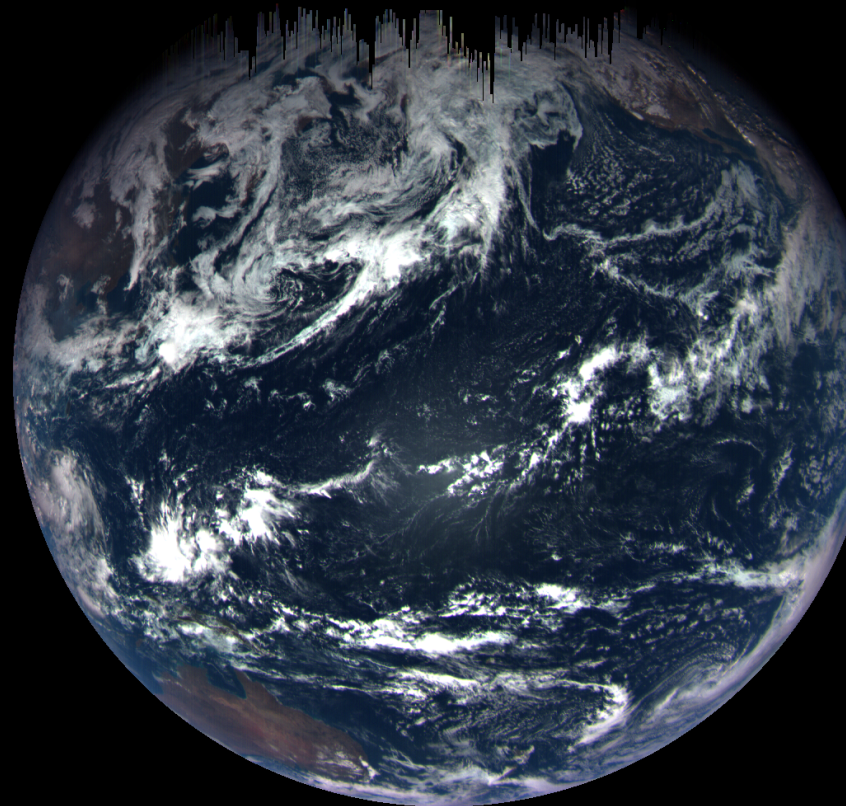


Image of Earth taken by OSIRIS-REx during gravity assist, September 2017



Missions (continued)

- Others of interest to SBAG
 - CAESAR
 - Comet sample return, New Frontiers finalist
 - NEOCam
 - Discovery 13 finalist, Planetary Defense priority
 - DART
 - Planetary Defense demonstration in discussion
 - Martian Moons Explorer
 - JAXA mission to study Martian moons, return sample from Phobos

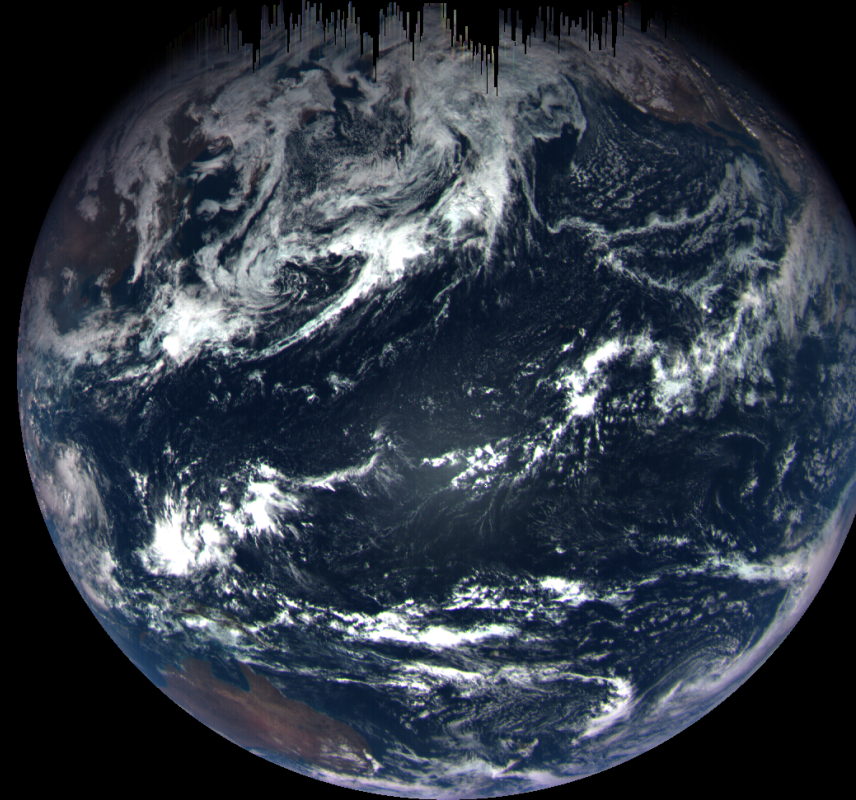


Image of Earth taken by OSIRIS-REx during gravity assist, September 2017

Current and Approved Future Missions to Small Bodies in the Solar System



Psyche
future
NASA

OSIRIS-REx
current NASA

MMX
future
JAXA

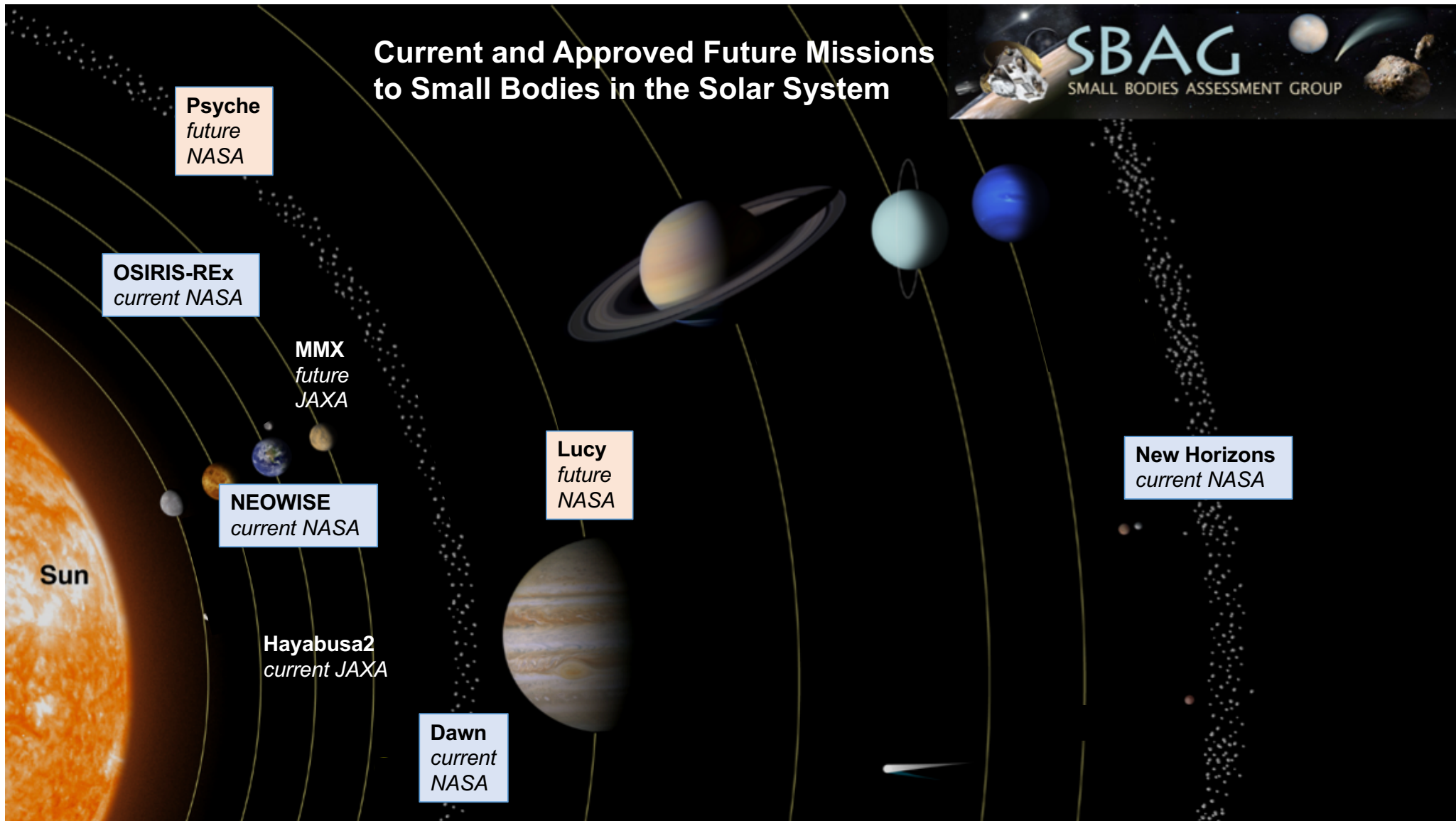
NEOWISE
current NASA

Hayabusa2
current JAXA

Dawn
current
NASA

Lucy
future
NASA

New Horizons
current NASA





Findings

Abbreviated version of preliminary findings.
Full SBAG 18 findings at:
<http://www.lpi.usra.edu/sbag/findings/>

- Discovery Program:
 - SBAG is pleased to see that NASA is continuing to strive to meet the recommended launch cadence for Discovery-class missions laid out in the Decadal Study of one mission every 24 months or less, providing a healthy PI-led Discovery program.
- Arecibo Observatory
 - SBAG would like to express its appreciation to NSF and NASA for their continued support of the Arecibo Observatory in Puerto Rico, particularly in light of the damage incurred from Hurricane Maria.
- Moving-object Tracking for WFIRST
 - SBAG encourages NASA to pursue means of preserving support for moving-object tracking on the Wide-Field Infrared Survey Telescope (WFIRST).



Findings

Abbreviated version of preliminary findings.
Full SBAG 18 findings at:
<http://www.lpi.usra.edu/sbag/findings/>

- Mission Studies for Ceres and KBOs:
 - SBAG enthusiastically supports the ongoing and upcoming pre-decadal studies about the exploration of Ceres and of Kuiper Belt objects (KBOs).
- NEOCam
 - SBAG is enthusiastic that NASA is continuing to work with the NEOCam team and the Jet Propulsion Laboratory to streamline and make necessary changes to the proposed mission such that it can be fully funded and implemented, particularly if it retains multichannel imaging.
- Transparency about Major Changes to ROSES and Announcements of Opportunity
 - SBAG recommends that NASA clearly communicate the reasons behind changes to ROSES proposal calls and major changes between announcements of opportunity.



Findings

Abbreviated version of preliminary findings.
Full SBAG 18 findings at:
<http://www.lpi.usra.edu/sbag/findings/>

- Radioisotope Power Systems:
 - SBAG is disappointed that radioisotope power systems (RPS) will not be available for the 2019 Discovery mission opportunity but applauds NASA's efforts to sponsor the production of plutonium-238 and RPS technologies.
- USGS Studies of Asteroid Resources
 - SBAG encourages NASA to consider collaborating with the United States Geological Survey (USGS) on matters of shared interest regarding asteroid resources, and to explore the possibility of supporting small bodies experts as appropriate, perhaps via establishing new dedicated research and analysis programs, for collaborations with USGS on this topic.
- SIMPLEX Call:
 - SBAG appreciates the release of the draft of the Small Innovative Missions for Planetary Exploration (SIMPLEX) solicitation, is anxious to see full solicitation



Full SBAG goals at: <http://www.lpi.usra.edu/sbag/goals/>

Small Bodies Goals

- Goal 1: Small Bodies, Big Science.
 - Investigate the Solar System's formation and evolution and advance our knowledge about the early Solar System conditions necessary for the origin of life through research and exploration uniquely enabled by small bodies.
- Goal 2: Defend Planet Earth.
 - Understand the population of small bodies that may impact our planet and develop ways to defend the Earth against any potential hazards.
- Goal 3: Enable Human Exploration.
 - Advance our knowledge of potential destinations for human exploration within the small body population and develop an understanding of the physical properties of these objects that would enable a sustainable human presence beyond the Earth-Moon system.
- *Goal 4: In-space resource utilization.*
 - *To be added in 2018 revision*



SBAG Steering Committee:

- Tim Swindle (*U. Arizona*), Chair (8/16-8/19)
- Dan Adamo, Human Exploration Lead (8/17-8/20)
- Julie Castillo-Rogez (JPL) (8/16-8/19)
- Paul Chodas (*JPL*) Planetary Defense Lead (8/16-8/19)
- Carolyn Ernst (*JHU/APL*) (8/17-8/20)
- Lori Feaga (*U. Maryland*) (8/15-8/18)
- Christine Hartzell (*U. Maryland*) (8/16-8/19)
- Carolyn Mercer (*NASA Glenn*), Technology Lead (8/15-8/18)
- Andy Rivkin (*JHU/APL*) (8/17-8/20)
- Hannah Susorney (*U. British Columbia*), Early Career Secretary (8/17-1/20)
- Patrick Taylor (*Arecibo*) (8/17-8/20)



Future SBAG Meetings:

- **June 13-15, 2018:** 19th SBAG Meeting
University of Maryland, College Park, Maryland
- **January, 2019:** 20th SBAG Meeting (dates TBD)
NASA-Johnson Space Center, Houston, Texas